RESIDENT'S CORNER

Pyelocystostomy for treatment of recurrent nephrolithiasis and ureteropelvic junction obstruction in a pelvic kidney

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Patients with pelvic kidneys are at an increased risk of developing ureteropelvic junction obstruction (UPJO) and nephrolithiasis with limited endourologic options. A 54-year-old man with a left pelvic kidney, recurrent nephrolithiasis, and 12 previous ureteroscopies presented with left UPJO and lower pole calyceal stones. After two failed ureteroscopic attempts, an open pyelolithotomy and pyelocystostomy were performed. After 30 months, he continues to be asymptomatic without recurrence of nephrolithiasis. This constitutes the fifth such reported case. Therefore, pyelocystotomy is a good option for patients with pelvic kidneys, UPJO and recurrent nephrolithiasis refractory to endourologic procedures.

Key Words: ureteral obstruction, urinary bladder, disease management

Introduction

The incidence of pelvic kidney is estimated to be between 1 in 2100 to 3000 people.[1] Most patients with renal ectopia are asymptomatic. However, approximately one third present clinically with recurrent pain that is secondary to incomplete urinary drainage.[1] The cause of incomplete drainage is multifactorial and it is related to the anatomical location of the kidney within the pelvis, a high ureteropelvic junction (UPJ) insertion, tortuosity of the ureter, and malrotation of the kidney.[1] As a consequence, patients are more likely to develop nephrolithiasis secondary to the urinary stasis thus further exacerbating obstructive symptoms. Because of the pelvic location of the kidney, endourologic procedures could be challenging. For example, extracorporeal shockwave lithotripsy (SWL) in pelvic kidneys is associated with lower success rates due to being guarded by the bony pelvis and the presence of fibrous bands impeding pyeloureteral motility.[2] On the other hand, retrograde ureteroscopy is compromised by the tortuous ureter limiting the deflection of flexible ureteroscopes.[2] While percutaneous nephrolithotomy (PCNL) has been reported in pelvic kidneys, it carries the risk of injuring surrounding pelvic structures and organs unless access is obtained under laparoscopic or CT guidance.[3] The occurrence of UPJ obstruction (UPJO) in the ectopic kidney is estimated to be between 22% to 37%.[2] The correction of UPJO in the pelvic kidney poses a greater challenge. Given that stones are associated with UPJO in ectopic kidneys, it is important that treatments are targeted at relieving obstruction in addition to removing stones. In this case report, a patient with a left pelvic kidney, recurrent nephrolithiasis, and 12 previous ureteroscopies presented with left UPJO and lower pole calyceal stones. He was managed with open pyelolithotomy and pyelocystostomy.

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Case report

A 54-year-old male presented to the emergency department complaining of a 3 day history of severe pelvic and left flank pain. His past medical history is significant for a left pelvic kidney, bilateral recurrent nephrolithiasis with 12 previous left ureteroscopies,

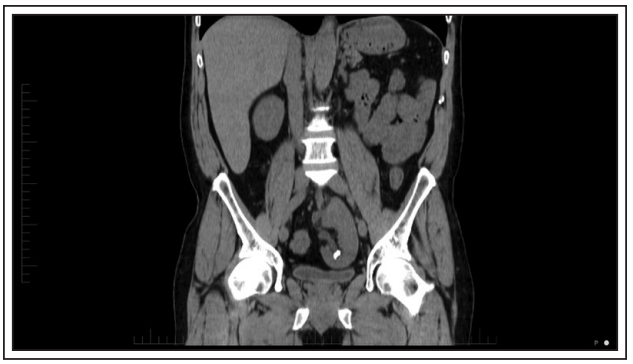

Figure 1a. Non-contrast coronal CT showing lower pole calyceal stone in the left pelvic kidney.

repair of a right inguinal hernia and hypertension. The patient mentioned that during one of these previous ureteroscopies, a flexible ureteroscope was broken during manipulation through the tortuous left ureter. Pelvic and abdominal ultrasound at the time revealed a left pelvic kidney with moderate-to-severe hydronephrosis, upper pole calyceal stone measuring 6 mm in addition to two lower pole stones, 7 mm and 8 mm in diameter. CT scan confirmed these findings, Figures 1a and 1b. Initially, the patient refused an indwelling ureteral stent. Once the pain was controlled, the patient underwent retrograde ureteroscopy, where a pinpoint left UPJO was found. Laser endopyelotomy was performed to relieve the obstruction and enter the left renal pelvis retrogradely. The lower pole stones could not be visualized due to tortuosity of the ureter. A 6F x 20 cm indwelling double pig-tail ureteral stent was placed. During a second ureteroscopy 2 weeks later, lower pole stones were moved to the upper pole. However, it was not safe to pass the laser fiber through the tortuous flexible ureteroscope to perform laser lithotripsy. Therefore, an indwelling ureteral stent was left in place. After discussing with the patient, an open pyelolithotomy and pyelocystostomy was offered to the patient for definitive management of both UPJO and obstructive nephrolithiasis. Using an extra-peritoneal approach, the left pelvic kidney was exposed and the left renal pelvis was vertically incised 2 cm. Flexible nephroscopy was performed through the pyelotomy to basket out all renal stones. Once stone-free, the bladder was anastomosed to the renal pelvis using absorbable sutures. A 20F Foley suprapubic catheter was placed through the right lower quadrant, passed through the pyelocystostomy to keep the anastomosis open and reduce risk of stricture. A Jackson-Pratt drain was left in place which was later removed. There were no intraoperative or postoperative complications. Three weeks later, after confirming lack of contrast extravasation with retrograde cystography, the urethral catheter was removed with a successful trial of voiding. At 5 weeks postoperatively, the suprapubic catheter was removed. A follow up CT urogram showed patent pyelocystostomy and lack of recurrent left renal stones, Figure 1c. In addition, a diuretic renal scan showed that the left pelvic kidney had a differential function of 45% without any signs of obstruction. Stone analysis demonstrated a mixture of calcium oxalate and calcium phosphate stones. Metabolic stone work up revealed low urinary volumes of 1.7 L and 1.0 L daily in addition to hyperuricosuria, hypocitraturia and hyperoxaluria. Therefore, he was encouraged to consume at least 2 L of fluids/day, follow low oxalate and low purine diet. Furthermore, he was prescribed potassium citrate 10 mEq TID for hypocitraturia and allopurinol 100 mg DIE for his recurrent calcium oxalate stones, hyperuricosuria and normal urinary calcium as per the American Urological Association guidelines.[4] After 30 months, the patient remains asymptomatic

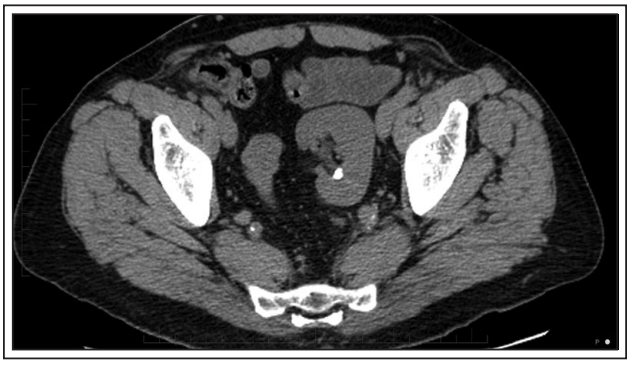

Figure 1b. Non-contrast axial CT showing the second lower pole calyceal stone in the left pelvic kidney.

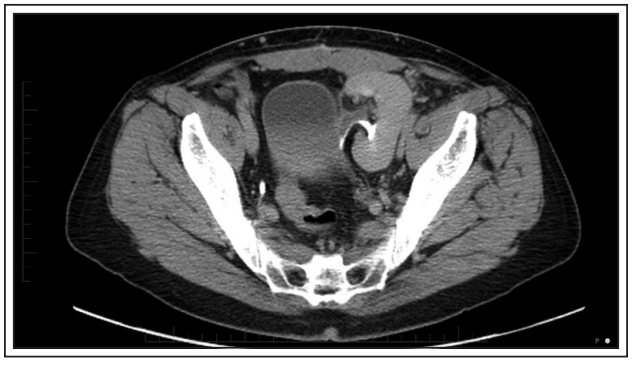

Figure 1c. Postoperative excretory phase CT scan showing patent pyelocystostomy with contrast flowing from the left renal pelvis to the bladder.

without any evidence of recurrent nephrolithiasis in the left pelvic kidney nor any urinary tract infections (UTI). A recent cystoscopy reveals patent pyelocystostomy without any evidence of left renal pelvic stones.

Discussion

The first reported use of pyelocystostomy for correction of hydronephrosis was in 1929 by Hess et al.[5] The procedure has since been implemented in the treatment of ureteral damage or necrosis following renal autotransplantion with good outcomes. However, it is rarely used in patients with pelvic kidneys. There are a total of four previous case reports on the use of pyelocystostomy for treatment of UPJO in pelvic kidneys. Here, we present the fifth case report, that of a patient with a pelvic kidney, recurrent nephrolithiasis, 12 previous ureteroscopies resulting in UPJO. He subsequently underwent an open pyelolithotomy and pyelocystostomy as a definitive management. A common concern post pyelocystostomy is the possibility of increased reflux and ease of progression of simple cystitis to pyelonephritis. Ranch and colleagues demonstrated that pyelocystostomy post auto-transplantation in 20 patients resulted in transient dilatation of calyces at micturition with otherwise normal urodynamic findings. In addition, there was no difference in incidence of UTIs pre and post-pyelocystostomy.[6] In a subsequent follow up study at 98 months for the same 20 patients, there was no significant change in glomerular or tubular function despite demonstrating transient reflux on urethrocystography.[7] Furthermore, patients with recurrent nephrolithiasis were able to pass stones spontaneously and were free of stone recurrence and pain secondary to obstruction.[7] Beckingham et al obtained similar results in their study of nine patients that received pyelocystostomy for ureteric stenosis or necrosis following renal transplantation. Of the nine patients, only one developed impairment of renal function. In addition, only one patient suffered recurrent UTIs but was controlled with prophylactic antibiotics.[8] This is taking into consideration that these patients are immunosuppressed. In our case, the patient has maintained normal kidney function as evidenced by stable serum creatinine (98 umol/L) and stable renal scan with ERPF of 436 mL/min with left pelvic kidney contributing 45% without any signs of obstruction. In addition our patient has had no recurrence of nephrolithiasis in the left pelvic kidney over a period of 30 months. Therefore, pyelocystotomy is a good option for patients with pelvic kidneys, UPJO and recurrent nephrolithiasis refractory to endourologic procedures. As such, it provides easy access through the bladder to the pelvic kidney for future diagnosis and treatment of nephrolithiasis. □

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